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Didactic Culture: a theoretical perspective to understand (non)innovation in teaching

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ABSTRACT – *Didactic Culture*: a theoretical perspective to understand (non)innovation in teaching. Different studies have signaled the difficulty teachers have in innovating their classroom practices. To better understand this difficulty, this article proposes the notion of *didactic culture*. In view of the concepts of *culture*, *school culture*, *area culture* and *scientific culture* and *didactic transposition*, the concept of *didactic culture* is presented as a way of understanding the social mechanisms that act in the microcosm of the classroom, working as the fluid medium that both enables and restrains practical innovations. At the end, it presents an example of the use of the concept research and future perspectives of theoretical elaboration.
Keywords: **Innovation. Culture. Didactic Culture. School Culture. Teaching Practices.**

RESUMO – *Cultura Didática*: olhar teórico para compreender a (não) inovação no ensino. Diferentes estudos têm sinalizado a dificuldade dos professores em inovar suas práticas. Para melhor compreender esta dificuldade, propõe-se a noção de *cultura didática*. Tendo em vista os conceitos de *cultura*, *cultura escolar*, *cultura de área* e *cultura científica* e *transposição didática*, o conceito de *cultura didática* é apresentado como uma forma de compreender os mecanismos sociais que atuam no microcosmo da sala de aula, funcionando como o meio fluido que tanto possibilita como refreia as inovações de caráter prático. Apresenta-se, ao final, um exemplo do uso do conceito para pesquisa em campo e perspectivas futuras de elaboração teórica.
Palavras-chave: **Inovação. Cultura. Cultura Didática. Cultura Escolar. Práticas Docentes.**

Introduction

In recent years, educational research has directed a diversified look in an attempt to better understand the educational, teaching and learning processes. Among the focuses that have been investigated, those that seek to understand the origins of practices developed in the classroom, as well as the tendency of reproduction of those practices crystallized over decades, stand out. In these studies, many of which fall within the field of teaching knowledge, the arsenal that teachers put into action is discussed and how, often, this arsenal has remained strongly static over the years, with only a few "superficial scratches".

In this context, authors such as Gauthier et al. (1998), Shulman (1987) and Tardif (2014) have brought great contributions to the study of teaching, by recognizing a set of knowledge that permeates the actions of teachers. Such ideas have been used, for some years now, to think about issues such as teacher training, classroom practice, teacher identity and professionalism. However, in our view, the contributions of these authors rest on a description of teaching practice and action, without detailing the intricacies of their mechanisms of change or resistance.

We see that studying innovation without understanding such mechanisms has brought a sense of frustration to some of the noblest attempts that see the school context as a barrier to changes, not only institutional, but also social (Harres et al., 2018; Pereira, César, 2016; Pavan et al., 2014; Arceo, 2012). The purpose of this article is, then, to try to delve into these social and institutional mechanisms that stand as obstacles to teaching innovation. and that, as we will see in a broader character, deny changes in a symbolic and practical sense in the classroom. In this article, the mechanisms of change and reproduction, within the scope of school education, are treated based on the concepts of *culture*, *school culture*, *area culture* and *scientific culture*, culminating in the proposal of the concept of *didactic culture*.

We hope, based on the concept of *culture* assumed here as a viscous medium for maintenance and changes, to design a mechanism that will serve as a background for understanding so that we can more properly investigate processes that aim to be innovative.

What we do mean by Culture

The concept of *culture*, through which we will seek to understand the mechanisms involved in the maintenance and change of teaching practice, is polysemic both in common and everyday use and in academic literature. Even in areas that have made great contributions to the formalization and/or discussion of this concept, such as anthropology or sociology, there is no consensus; so that defining and situating it, amidst the different formulations, becomes necessary. In this task, we appropriate some ideas from the social historian William H. Sewell

Jr. (2017) who, in his work entitled *Logics of History: Social Theory and Social Transformation*, dedicates a chapter to the discussion of this concept.

According to Sewell Jr. (2017), the use of the term culture is divided into two groups of different meanings: (i) culture as an abstract category of social life and (ii) culture as a concrete and delimited world of beliefs and practices. Regarding the first meaning, the author states that culture would be a category of social life among others (for example, like Economics, Politics or Biology); it consists, therefore, in a theoretical abstraction of the complex reality of human existence. The second meaning, on the other hand, would be related to characteristics of a people, specific social group, etc., which refers to a set composed of their beliefs and/or practices. In the second sense, terms such as Brazilian culture, middle class culture, American culture, etc.

After presenting a diversity of notions for the term, explaining its limitations, Sewell Jr. (2017) is dedicated to two notions in which culture is associated with a concrete and delimited world of beliefs and practices that are, for the author, very useful in the elaboration of his own notion of *culture*. O The author considers fruitful the notions of: (i) *culture as a system of symbols and meanings* and that of (ii) *culture as a practice*.

According to Sewell Jr. (2017), the notion of culture as a system of symbols and meanings was hegemonic in the 1960s and 1970s, especially in American anthropology. The notion had as some of its main representatives the American anthropologists Clifford Geertz and David Schneider. These researchers were inspired by the notion of *cultural system*[1] by the American sociologist Talcott Parsons, the British anthropologist Victor Turner and the Belgian anthropologist and philosopher Claude Lévi-Strauss, which appropriated or were inspired by the concepts of *signifier* and *signified* by the renowned linguist Ferdinand de Saussure. Commenting on the notion of *culture as a system of symbols and meanings*, Sewell Jr. (2017, p. 167) states:

> The intention of conceptualizing culture as a system of symbols and meanings is to unravel, for the purpose of analysis, the semiotic influences on the action of other types of influences – demographic, geographic, biological, technological, economic, etc. – with which they are necessarily mixed in a concrete sequence of behavior.

In this notion of culture, there is a semiotic medium, that is, a set of symbols and meanings imbued in action in the world, which influence human beliefs and behaviors and are, in a certain way, stable. On this certain stability, Sewell Jr. (2017, p. 167) also highlights that the authors who used this notion abstracted "[…] a domain of pure meaning from the complex confusion of social life and sought to specify its internal coherence and deep logic".

For Sewell Jr., however, this definition of culture as a system of symbols and meanings presents problems when interpreted as having a logic, a coherence, a uniformity and a continuity: trying to define it in

this way, ignoring the dynamics of social relations and cultural changes, inevitably leads to a stagnant conception of culture that would hardly represent the subjects who reproduce it in its entirety. Furthermore, Sewell Jr. (2017) indicates that, in anthropology, this notion is strongly questioned, since the meanings would be politically charged: contradictory, changeable and fragmented. However, the criticisms of this notion of culture seem to us to refer much more to a need to reformulate the understanding of the system of symbols and meanings than to a denial of the concept[2].

In contrast to this more static and delimitable conceptualization of culture, it appears, between the 1970s and 1980s, represented by various terms such as *resistance, history, politics* or *culture as a set of tools*, the understanding of culture as being composed of a set of practices. With the appropriation of the concept of *practice* suggested by Pierre Bourdieu (1977), culture is taken away from its coherent, uniform and immutable portrait and begins to represent the malleability, mutability and inconsistency of cultural meanings, focusing much more on the mechanisms – or practices – through which resignifications took place.

Thus, with the departure from the anthropological cultural study, which is heavily criticized on the charge of carrying a determinism, some authors of sociology and cultural history appropriate the term *culture*, redefining it as a practice in order to try to explain the transformations of social order. In this sense, *culture* becomes a fluid concept that collects a series of tools for change, as can be seen in the fragment that highlights the conceptualization of the term by sociologists, which follows:

> This led many of them to conceptualize culture so that it could be constructed as a collection of variables whose influence on behavior can be rigorously compared to that of standard sociological variables such as class, gender, education level, economic interest, etc. The consequence was a move away from earlier Weberian, Durkheimian or Parsonian conceptions of culture as very vague and general 'value orientations', towards what Ann Swidler called a 'tool kit' composed of a 'repertoire' of 'action strategy' (Sewell Jr., 2017, p. 168-169).

Since this new definition, culture is no longer understood as a system of symbols and meanings, but as a set of actions, that is, practices; which makes it possible to understand the social processes and tools that allow, for example, the re-signification of symbols, explaining that cultural changes occur in the social environment.

In our study, as we try to understand culture as the mechanism of change and maintenance, that is, of innovation and resistance – more specifically, of didactic actions – we understand that it is necessary to go beyond the understanding that both previous concepts mutually exclude each other. This is how, with the same annoyance, but with a research interest in the field of social history, that Sewell Jr. (2017) proposes a notion of *culture as a system and practice*, that is, it is assumed

that culture consists of a system of symbols and meanings and, at the same time, has a practical dimension. As he argues, system and practice are complementary, as "[…] engaging in cultural practices means using existing cultural symbols to accomplish some purpose" (Sewell Jr., 2017, p. 170), and the use of a symbol would only be able to achieve a specific objective in view of the existence of more or less determined meanings for these symbols. In this way, the practice refers to the system of symbols and meanings, so that, without it, it would become empty actions. Sewell Jr. still states that the system exists due to the practices that list it, reproduce it and transform it, so that the system also refers to the practice in a dialectical relationship.

Such dual formalization for culture, as proposed by Sewell Jr. (2017), brings with it some important and vital characteristics for the understanding of maintenance processes – coming from the notion from *culture as a system* – and from the processes of change – coming from the notion of *culture as practice*:

a) there are cultures, in the plural, and not just one culture. Thus, one can speak of medical culture, composed of the set of symbols and meanings that configure medical practice, scientific culture, school culture, Brazilian culture, Jewish culture, among others;

b) cultures have weak borders, therefore, cannot be well delimited, since cultures considered to be "distinct" may share systems and practices. In this way, it is impossible to try to infer when one culture ends and another begins, which does not make it impossible to characterize some elements that are part of one culture or another;

c) cultures can coexist in the individual. In this way, a single person can be part of more than one culture, as in the example of an immigrant Latino homosexual journalist, who carries a myriad of cultures within her - without one necessarily denying the other;

d) different cultures intersect and clash with each other. Thus, different cultures can interact, for example, in the encounter of two previously isolated peoples, but they can also be found in the core of the individual. As an example, we could try to understand medical culture by interacting with scientific culture in a medical researcher. This interaction can even, when taken to social proportions, cause profound changes in both cultures or even give birth to a new specific culture;

e) cultures are autonomous. Therefore, a culture has a character of independence from other cultures and, thus, creates its own symbols and meanings and resists external pressures. Thus, cultures are a fertile ground for understanding the processes of maintenance and renewal of meanings and practices;

f) cultures are coherent. In this way, two people who belong to the same culture share, to some extent, the same system of meanings and practices, which allows the configuration of social actions

with synchronous expression, as in the case of religious rituals in which people from the same religious culture synchronously follow the same steps.

The characteristics of this cultural definition combine practice and a system of symbols and meanings; allow us to understand culture as relatively static and coherent, but which, when in practice, suffers the latent risk of being modified. Thus, culture gains this viscous character to changes, which both enable its fluidity and restrain it. Maintenance resides in the ability of symbols and meanings to reproduce themselves - through practices - without changes and to reinforce themselves socially in order to further solidify themselves as traditions. Latent mutability – the possibility of cultural change –, in turn, resides in the uncertain nature of practices that, when carried out, offer the culture the risk of being reinforced or reformed.

In this sense, practices are shaped by symbols and meanings while allowing resignifications. As an example, when we assume teaching practice as part of a cultural dimension, we can recognize that a certain common action of the teacher, such as developing a theme in a certain way with certain resources, can represent a reproduction of the culture that precedes the teacher himself/herself and the which he/she is a part of. Recognizing this, it seems pertinent to discuss the intertwining between culture and structure, as inherent to the processes of change or maintenance in which human and material (non-human) resources are employed. To this end, we dedicate the following section.

Structure, Cultural Schemes and Resources

Still in the book *Logics of History: Social Theory and Social Transformation*, in addition to conceptualizing culture, Sewell Jr. (2017) elaborates their theoretical construction addressing another relevant notion: the concept of *structure*, which is often associated with cultural studies carried out mainly in the field of anthropology. Although it is not the purpose of this text to delve into the entire structuralist and post-structuralist construction, some of the aspects of this definition of the term, popularized by Levi-Strauss, become very useful to understand the relationship between innovation, culture, knowledge and the availability of instruments.

From the critique, elaboration and reformulation of Anthony Giddens and Pierre Bourdieu's theories on the concept, which occur as a rupture with the structuralist vision, Sewell Jr. understands structure as a duality formed by cultural schemes and resources. The cultural schemes he refers to would be constituted by cultures – here understood according to the formulation of the previous section – as systems of symbols, meanings and practices. The resources, in turn, would operate as the material part of the structure, removing from it its exclusively virtual quality, as already defended by Giddens (2009). These resources, in addition to constituting a duality with the schemas, can also be di-

vided into human and non-human, a characteristic understood in the following fragment:

> Nonhuman resources are objects, animate or inanimate, naturally occurring or manufactured, that can be used to increase or maintain power; human resources are physical strength, dexterity, knowledge and emotional commitments that can be used to increase or maintain power, including knowledge of the means of obtaining, retaining, controlling and propagating resources, whether human or non-human (Sewell Jr., 2017, p. 140).

According to this definition, for example, resources would be: the power of consecration of the priests of the Catholic Church; weapons stockpiles held by nations; ownership of factories by capitalists; the power attributed to a statesman; among others. Some other examples of resources, which are particularly useful for the didactic scope of this work, would be: scientific knowledge itself; the typical sequence of content in a subject; the knowledge to be taught in the classroom; the tools available in the room (such as a blackboard and desks); a teacher's authority towards students, and his/her authority as to the way in which he/she develops the contents of his/her subject; the skills and abilities of the teacher and students, etc.

Having this duality between resources and schemas, we can recognize a dynamicity: the practice, which takes place according to cultural schemes, creates resources (human or non-human) and reinforces or modifies them, increasing their character promoting changes. In order to be carried out, practices still need resources, since without them it would not be possible to materialize them.

As much as this is a development that goes beyond what is strictly necessary to understand the cultural formulation, we believe that this brief explanation can improve the understanding regarding the use of the term resources that we will make from now on. This definition helps us by placing nonhuman and human resources in a category distinct from cultural schemes. With this boundary defined, we will be able to better understand the concept of *school culture*, which concerns the way in which culture permeates school systems and spaces, as well as the notions of *area culture* or *scientific culture*, also presented in this article.

The Concept of *School Culture*

The perspective on education and school practices, in view of the inherently cultural aspects, is something that has already been explored in some lines of research. In the field of study of the History of Education, attempts to understand school dynamics and their role from a cultural perspective are not new. Some researchers, since the turn of the 20th to the 21st century, such as Forquin (1993), Chervel (1998), Julia (2001) and Gómez (2001) have been incorporating, in their discussions, the cultural dimension of school spaces and structures. Starting from different cultural perspectives, these incorporations bring a polysemy

to terms such as *school culture* or *culture of the school*, in addition to explaining the authors' different intentions.

An author worth mentioning, due to the proximity of his cultural perspective to that of Sewell Jr., is the Spanish researcher and educator Viñao Frago. This author uses the notion of school culture to try to understand, mainly, the mechanism that leads to the maintenance of processes in school systems, even in the face of institutional proposals for change (Viñao Frago, 2007). In his historical-educational study of educational reforms and the reason for their few practical effects on school and classroom dynamics, the author makes use of the concept of *school culture* and, in our view, similarly to Sewell Jr., it seeks its definition in the dialectic between systems and practices. In his book *Educational Systems, School Cultures and Reforms*, he provides a definition of the concept:

> School culture, understood in this way, would be constituted by a set of theories, ideas, principles, norms, models, rituals, inertias, habits and practices (ways of doing and thinking, mentalities and behaviors) sedimented over time in the form of traditions, regularities and rules of the game that are not interdicted, and shared among their actors, within educational institutions (Viñao Frago, 2007, p. 87).

As we can see, its definition encompasses different aspects inherent to school systems that, in essence, sometimes incorporate aspects related to the meanings assumed in relation to practical reality, sometimes directly about the practice itself. There is, therefore, a plausible way to approach the studies of Sewell Jr.

It is also worth noting that although Viñao Frago's focus rests on school cultural aspects that remain perennial despite, for example, educational reforms, he does not deny that there have been changes in the cultural educational context over the years. In this sense, he privileges the study of resistance to change, while rejecting the idea that education remains static over time, that is, oblivious to changes in society. Its construction aims, therefore, to understand the slowness of these changes, which conforms to the cultural characteristics of the definition by systems and meanings, with autonomy and coherence.

Viñao Frago's contributions are especially relevant to the understanding of innovation attempts at macro-scale, involving the educational structure, and meso-scale, involving the school structure. Regarding the microscale, which is our study interest, Viñao Frago only seems to touch it, without this representing a demerit of his work. Due to our narrower focus on the microscale of the classroom, even if we assume Viñao Frago's notion of *school culture* in terms of - and in an approximation to - Sewell Jr.'s notion of *culture as a system and practice*, we perceive the need to understand, for example, the didactic (non)innovation limited to one or a few school subjects.

Thus, we question ourselves about the possible explanatory limits of the notion of school culture to think about the microcosm of the

classroom, that is, when we leave a macro view of the History of Education or public education policies. As our gaze falls more specifically on how changes could interfere or could arise in the way in which a teacher - or a class of teachers immersed in a culture - teaches a sequence of activities on a certain subject within a specific discipline, we notice the need to recognize the cultural character that permeates and differentiates each school discipline. In doing so, we understand that school culture is an influential component in a more specific culture, which understands the common meanings and practices in a school subject and which differentiates it from other subjects.

In our understanding, going beyond the notion of *school culture* is necessary, because (i) *even in a school permeated by a school culture, there are differences in the teaching strategies of the different subjects.* For example, there is no complete correspondence in the symbols, meanings and practices of teaching Physics, Biology, Mathematics, or History. In addition, (ii) *even in different schools, permeated by different school cultures*, there are many similarities in the teaching of/around the same subject. Thus, even though two schools are circumscribed in different cultural spaces, for example in a private school located in a capital of Southeast Brazil and a public school located in the interior of the North region of the country, the teaching of a school subject, such as Physics, usually happens around the same symbols, meanings and practices.

In order to try to understand this culture around a discipline, for which we observe a transversal character to the *school culture*, in which, at the same time, it differs within the same school culture, and is similar through different school cultures, it will be necessary to bring a new definition. Thus, while recognizing the influences of school culture on the school and on its mechanisms as a whole, we see the need to define a type of *culture* that focuses on classroom interactions and on the cultural way of teaching a specific theme. The culture around a school subject (or a topic of a subject), which we will define better later on, seems to be also influenced by elements and traditions of the areas of knowledge related to the themes and contents taught in the body of a subject school. In the cultural perspective that we assume, we recognize as influential, in addition to the *school culture*, an *area culture* that, for example, in the case of teaching Sciences, we can identify as a *scientific culture.*

Area Culture: the example of *scientific culture*

To try to understand the transversal character to the *school culture* of the symbols, meanings and practices around a subject, we look for the notion of *area culture*, also proposed in this article, the indicative of characteristics that can, when associated with the already mentioned characteristics of the *school culture*, explain the mechanism by which the change and maintenance of teaching practices can occur. We can assume as *area culture* that set of symbols and meanings, in addition to practices, which, in mediation with resources, make up a structure of a certain field of knowledge. To illustrate this concept, which will also be

useful for the formalization of the notion of *didactic culture* that we propose in this article, we can bring the notion of *scientific culture*, which has been used with some frequency in the field of Science Education to discuss the relationships between educational and cultural aspects.

We can say, based on the notion of culture that we assume, that *scientific culture* consists of a set of symbols, meanings and practices that establish coherence and autonomy with scientific practices and that are shared by a group – in the case of *scientific culture* – or subgroup – in the case of a cut of the practices of a scientific community as a *culture of Physics* or a *culture of Quantum Physics*. It is important to say that, as already highlighted, the borders placed for a culture, in addition to not being well defined, are not fixed and occur depending on the object of study, and may be restricted or softened depending on the scope of observation. By doing, for example, a study around the practices carried out around the teaching of a martial art, one can define a *judo culture* and at the same time, by doing the study of sports practices, one can define a *sport culture*, the two existences are not contradictory and one can be included, or not, in the other.

In accordance with this mobile delimitation of the boundaries of a culture, Glen Aikenhead (1996) defines *scientific culture* in a Geertzian perspective, that is, bringing the semiotic dimension of symbols and meanings to the understanding of *scientific culture*. Going further, Aikenhead (1996) brings the cultural perspective of Phelan, Davidson and Cao (1991), which complements Geertz's perspective by bringing a definition as: "[…] values, beliefs, expectations and conventional actions of a group[3]" (Aikenhead, 1996, p. 8), approaching, in our view, the proposal of Sewell Jr. of a system of symbols, meanings and practices.

Following Aikenhead's (1996) definition of *scientific culture*, we can finally explore the transversal character in relation to *school culture*, which allows us to understand the origin of some symbols, meanings and practices that remain distributed across different school cultures, and that differ between subjects, for example, History and Physics, or Chemistry and the Portuguese language. The scientific culture of Physics, for example, could explain the existence of consolidated practices in Physics teaching, such as the use of experiments or the deepening of mathematical relationships, since these practices are also consolidated in the study of this area of knowledge.

It cannot be said, however, that scientific culture explains and encompasses teaching practices around an entire school subject, since the process of schooling knowledge transposes not only scientific knowledge to didactic boundaries (Chevallard, 1991), but also the ways of teaching, a process that we hope to detail later in this text. Thus, there are practices, symbols and meanings whose uses in the scientific environment are unknown by the teaching environment, and vice versa. It can be said, therefore, that the two cultures are not coherent with each other and, therefore, are distinct, despite their undeniable intersections.

The mechanism within the classroom that explains situations of change and maintenance, innovation and resistance, - this viscous medium through which we try to understand the culture that encompasses didactic practices around a subject, or theme, more specifically, does not seem to reside exclusively neither in *school culture*, nor in *scientific culture*, despite sharing with them some of their symbols, meanings and practices. The *didactic culture*, the notion that we propose, seems to arise from the intersection of these two cultures, although it does not remain static at this intersection, creating an autonomous and coherent system of practices, which both differs within the same school and spreads across different schools.

The notion of *didactic culture*, as we will defend, offers us a lens that allows us to explore this dialectic between new and old teaching practices shared around a discipline, opening space for an understanding of this dynamics as two sides of the same mechanism and not as two different entities in opposition. Thus, the cultural understanding of classroom practices will allow us to look at the innovation processes, as well as their failures and their maintenance, understanding what some of the social processes involved would be.

Didactic Culture

As we have already explained in the previous topic, the *didactic culture* emerges from the intersection of the school culture with the *area culture* (*scientific culture*). From this intersection, the didactic culture emerges and consolidates, which shares symbols, meanings and practices with both cultures that form it, but also forms a whole new autonomous system of ways of acting and thinking that, in many elements, have no direct correspondence either with the *school culture* or with the *area culture* that originates it.

The *didactic transposition*, defended and popularized by Yves Chevallard (1991), provides a good starting point to try to understand the process of formation of *didactic culture* and how the other cultures mentioned are combined for this. It is through transposition and acting on it that the *didactic culture* arises, bringing not only elements of its predecessor cultures, but also new elements that constitute it in a more exclusive way.

For Chevallard (1991), in the micro scope of the classroom, there is what is defined as a didactic system, composed of the relationships between teacher, students, the expected knowledge that is taught and that knowledge that is, in fact, taught. In the field of mathematics education, to which Chevallard directs his gaze, he recognizes that the knowledge constructed by mathematicians (knowledge of wisdom or erudite knowledge) does not coincide with the mathematical knowledge treated in textbooks, schools and curricula (knowledge for teach), nor with the knowledge actually presented/discussed by the teachers (knowledge taught). For the author, there is a didactic transposition that, not being a simplification of knowledge, consists of a process by

which a knowledge is constituted from a transformation of the reference knowledge, a transformation that makes the new knowledge only make sense in function of the education system or the didactic system.

As Chevallard (1991) brings in his book *La transposición didáctica: del saber sabio al saber enseñado*:

> The immediate environment of a didactic system is initially constituted by the teaching system, which brings together the set of didactic systems and has by its side a diverse set of structural devices that allow the didactic functioning and that intervene in it at different levels. It includes, for example, multiple means (official and unofficial) of regulating the flow of students between teaching systems, ensuring (among other functions) the formation of the set of teaching systems in a viable way. We will not dwell here on these questions, which essentially correspond to other areas of didactic analysis, in which equally profound problems arise (which refer precisely to the conditions for the viable constitution of didactic systems such as the heterogeneity or homogeneity of classes) (Chevallard, 1991, p. 27).

From what Chevallard has exposed, it is clear that he recognizes what we are identifying *school culture* and *didactic culture* as structural devices that consolidate a knowledge to be taught. Going further, he states that this question is not part of his focus of analysis. Thus, although Chevallard recognizes its existence and importance, the focus of the theory is not on the structure and processes that allow the construction of these didactic projects. We can say that this approach does not look at how they change or are maintained over time. A view that focuses more on the stages of construction and modification of the knowledge to be taught and taught - which, based on Sewell Jr. (2017), we understand as resources on which the system of symbols, meanings and didactic practices fall. In our view, by focusing on the analysis of taught knowledge that does not find correspondence in wise knowledge, the theory of transposition ends up also raising the possibility of a theoretical path: the existence of some meanings and practices exclusive to didactic cultures, without correspondence with the meanings and practices of scientific culture or school culture.

We can say that, in the didactic transposition, knowledge gains and makes sense as it consolidates in a link with the *school culture*, keeping some reference with the area of knowledge from which it comes. In other words, knowledge is instituted with meanings and practices characteristic of education systems, which are permeated by a school culture. However, having some subtle compatibility with wise knowledge, there is, in this process, the consolidation of a culture that incorporates and transforms meanings and practices of the area of knowledge that generates knowledge (for example, science and scientific culture), and this culture is not exactly the school culture, but what we call a *didactic culture*. This would be, therefore, that set of symbols, meanings and practices that contain and reframe elements from other cultures and,

therefore, is not well delimited nor restricted to a school. Due to its relationship with the practical and semiotic dimension of the area of knowledge, for example: science, and by the action of the noosphere[4] in the didactic transposition, it is constructed transversally in a teaching system, having knowledge and its transposition as a point of constructive genesis, and not exactly what happens in specific schools.

With this, we are not saying that the *didactic culture* is beyond the school. It is built only in contact with the school. But, due to its genesis, its "first shot", taking place within the scope of curricular discussions, it is natural that, unlike school culture - which concerns more a school or a set of schools in a micro or mesoregion -, the *didactic culture* often revolves around teaching topics. This explains, for example, why the meanings and practices surrounding the teaching of the same science topic tend to be reproduced in different contexts: it is the transversality of the *didactic culture*.

In this sense, it is important to emphasize that all the formulation that we have been doing throughout the text brings a different approach to the transposition process than what was originally given by the French author. While the traditional use of the theory brings a look at wise knowledge, knowledge to teach and knowledge taught, that is, the concepts, knowledge and contents that go through the process of transposition until, finally, they are taught, we, here, highlight exactly those aspects that Chevallard points out as being beyond his study interest, but which still have a relevance.

That said, although it is not the purpose of this article to delve even further into a detailed description of the genesis of the *didactic culture* around some theme or subject, the didactic transposition brings us a good understanding of what would be the steps of its formation. In our view, and as we have already exposed, starting from a *scientific culture*, cultural schemes would clash with the sphere of *school culture* and, as they interacted, they would reform, transform and encompass themselves, forming a new set of symbols, meanings and practices. It is in this conflict and emergence of meanings and practices that a *didactic culture* is constituted, in a process of approximation and, at the same time, of differentiation of *school culture* and *scientific culture*.

In view of what we have presented so far, we can list some characteristics of the notion of *didactic culture*, which better explain its formalization:

a) there are didactic cultures, in the plural, and not just one didactic culture. We can talk about the didactic culture of Physics, the didactic culture of History, the didactic culture of Philosophy, etc.;

b) the boundaries that define didactic culture are not fixed. The delimitation of a *didactic culture* depends on the object of study around which one wants to identify the elements to which it belongs. Thus, if we want to identify elements around the teaching of a specific topic, such as Modern Physics, we can delimit the didactic culture of Modern Physics, which will have exclusive elements of this subject;

c) didactic cultures have weak boundaries and cannot be well defined. That is why we are not talking about characterizing a *didactic culture*, but about characterizing some of its elements, since it is an impossible task to try to identify, for example, when the didactic culture of Geography ends and the scientific culture of Geography begins;

d) didactic cultures are coherent - which reinforces the characteristic of the didactic culture that crosses the borders of the school culture, being possible to observe symbols, meanings and coherent didactic practices, even in different schools, with different school cultures;

e) didactic cultures are autonomous. Thus, it is common to have attempts at changes at school-institutional levels not to enter the classroom of a specific subject, since the *didactic culture* is autonomous from the *school culture*. Autonomy plays an essential role for the character of both maintenance and change of the *didactic culture*, even in the midst of external pressures

f) resides, in the practical character of didactic cultures, their opportunity for change or consolidation. The understanding of the *didactic culture* allows us to identify the process of change or consolidation as inherent to the teaching practice and the system of symbols and meanings as responsible for the maintenance of the ways of teaching.

Having clarified these characteristics, we can finally identify the *didactic culture* as the possible viscous medium through which both maintenance and resistance and innovations and changes in teaching practice take place. It is using it as a theoretical tool that we seek to understand the reasons why practices around the teaching of a discipline or theme remain relatively static, even in the face of undeniable institutional and academic efforts to insert new resources into the classroom. Such efforts, driven by the understanding that they would enable the implementation of new teaching practices, can be materialized, for example, with the insertion of technological means in the classroom; with the external pressures coming from the academy, the scientific nucleus and society; with the curricular and structural changes of the school and the social demands in general. However, as a separate semiotic dimension, although related, the *didactic culture* tends to continue being reproduced even with the insertion of new resources, resignifying them in order to maintain those already consolidated practices.

Thus, this formulation of the concept of *didactic culture* allows us to understand why, even when having access to new resources – such as a computer, digital whiteboard, projector, etc. – that bring a myriad of new possibilities, a teacher still reproduces, for example, traditional expository practices, attributing to the new resource the same meaning and use of an old resource – such as the blackboard and chalk system. At the same time, it allows us to understand that, for there to be a change in teaching practice, it is not necessary to make a major change in re-

sources, but an effort to implement new practices that can also take into account the resignification of instruments already available.

It is not advocated, with the notion of *didactic culture*, however, that there is no concomitant importance of the renewal of resources, since they can serve as engines of innovation, bringing new possibilities of meaning and practices, even if they may not be implemented. It is only understood that the core of innovative practice is not in these renewals of resources, but in changing the teaching practice, based on itself.

The cultural perspective that we bring, inserted in the structural formulation, offers us an epistemological and methodological tool to better understand the teaching practices of a teaching area: the use of the notion of *didactic culture* allows a view centered on a school subject or on a teaching topic, and focused on the interaction between the didactic resources used and the meanings that permeate the didactic choices and the actions performed in the classroom. In this way, the notion allows us to recognize, for example, how even in the midst of a teacher's effort to access and use diversified knowledge in their practice, they will always be at risk of being disregarded the first moment they are put to the test in the contexts classroom realities.

In the next section, we will show how didactic culture could be used to better understand the processes that result from didactic innovation proposals. We bring an excerpt from a field research in which we identify cultural elements that involve the teaching of a curricular topic, highlighting the relationship between resources and action strategies and assumed meanings.

## An Application of the Concept of *Didactic Culture*

As a way of exemplifying the use of the concept that we define here, we bring some results of the initial stages of a case study involving the first experiences of an intern, majoring in physics, in conducting classes. The study sought to investigate the behavior of the intern teacher who, motivated by a proposal for an innovative class regency, prepared a teaching plan and developed it with students, in a class in the internship field. It is from this plan that the intern proposes an "innovative" class, trying to introduce new practices to the teaching of the theme "oblique launch" in the discipline of Physics.

As a preliminary stage of the study, to better understand how the didactic choices of the intern teacher represented an innovation, a mapping and verification of elements of the didactic culture around the theme, oblique launch, was carried out. For this, a survey was carried out with a group of participants, using an open-ended questionnaire. The questionnaire produced had 9 questions separated into 3 thematic axes, namely: class taught to him in high school (5 questions); typical lesson on oblique throwing (3 questions); and idealized class (1 question). At this stage, the study had 22 participants from a city in the interior of the state of São Paulo, among Physics teachers at university and

basic levels, in addition to undergraduate and teaching degree students in Physics. A survey of this nature, with teachers and students who are close to Physics and its teaching, reveals some of the latent elements in the understanding of physics teaching, regarding its resources and its practices. In this sense, the group of participants would provide analysis data especially useful for the identification of possible elements of a *didactic culture of oblique throwing*.

With the answers obtained with the application of the questionnaire, an *a posteriori* categorization was made by semantic proximity of some of its passages. The initial purpose of this categorization was to build the indicative elements that constitute the *didactic culture of oblique throwing*[5], which we would use to understand the innovation proposals present in the intern's teaching plan. From the results, it was possible to establish 9 representative categories, divided into 2 groups, as can be seen in Figure 1:

Figure 1 – Graphs with the Categories grouped in Strategies and Resources and the Number of Occurrences categorized
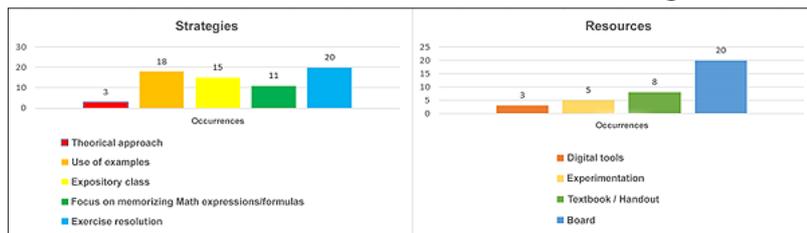
Source: Elaborated by the authors themselves.

In Figure 1, the numbers next to each column represent the number of occurrences of each type of strategies/schemes or resources among the participants' responses. As can be seen, the answers provided by the participants showed occurrences of 5 types of different strategies/schemes and 4 types of teaching resources.

The categories were formalized, which already represent an indication of cultural elements associated with the teaching of oblique throwing, with the use of the tool Atlas.ti – software also used for the marking of categorized citations and quantification of occurrences – it was also possible to count the co-occurrences[6] between the categories, two by two. In this way, it was possible to count the number of times the responses brought two associated ideas – resources or strategies – and build Figure 2, which provides the number of relationships made over the 22 responses collected.

Figure 2 – Table with the Number of Co-occurrences between the Highlighted Categories: with red text, for those that provide 5 or more co-occurrences

	Theorical approach N.O. = 3	Examples N.O. = 18	Expository N.O. = 15	Memorizing formulas N.O. = 11	Exercise resolution N.O. = 20	Digital N.O. = 3	Experiments N.O. = 5	Textbook / Handout N.O. = 8	Board N.O. = 20
Theorical approach N.O. = 3		1	2	2	2	0	1	2	1
Examples N.O. = 18	1		4	1	5	0	2	2	6
Expository N.O. = 15	2	4		6	5	1	0	2	9
Memorizing formulas N.O. = 11	2	1	6		5	0	0	1	2
Exercise resolution N.O. = 20	2	5	5	5		0	0	3	8
Digital N.O. = 3	0	0	1	0	0		0	0	1
Experiments N.O. = 5	1	2	0	0	0	0		1	1
Textbook / Handout N.O. = 8	2	2	2	1	3	0	1		4
Board N.O. = 20	1	6	9	2	8	1	1	4	

Source: Elaborated by the authors themselves.

Based on the co-occurrences, it was possible to map those elements that could be culturally related: for example, there was a great proximity between the indicative of lecture as a strategy and the blackboard as a resource, which, in a certain way, are possible markers of both school cultures and the didactic culture of the subject of Physics. It was also possible to trace a possibly strong relationship between pairs of strategies/schemes, such as lectures and memorization of formulas or solving exercises and examples, which represent elements of the didactic culture of the Physics, but not necessarily elements of school cultures, permeating other school subjects.

The recognition of possible elements of the didactic culture of the discipline of Physics or, more specifically, of elements of the didactic culture of oblique launch, demonstrates an analytical potential of the notion of *didactic culture* in the understanding of teaching: instead of identifying the teaching action as related to a reservoir of knowledge, for example the traditional or the experiential ones (Gauthier et al., 1998), the notion allows us to recognize an intimate relationship between the meanings that permeate teaching and learning, the action strategies and the resources themselves. In this sense, for example, an innovation in teaching practice starts to be seen, at a micro level and focused on the scope of a school subject, based on crystallized meanings that can be evoked and reaffirmed in change initiatives, hindering teaching innovation. Furthermore, it allows us to understand why traditional resources evoke traditional practices, highlighting the potential for changing resources, even if they are neither sufficient nor necessary for didactic innovation.

As we can see, the action strategies, which are aspects inherent to the culture and treated here as part of the cultural schemes, as well as the resources related to them, bring a portrait of what is easily characterized as a traditional teaching of Physics. In addition to confirming what appears to be common sense about teaching Physics, the survey included questions about the experiences that participants had or were

having with teaching the specific Physics topic addressed. In our view, these experiences signal a firm ground on which ways and means of teaching are thought. In this sense, more than bringing indicators of elements of a didactic culture, the survey explains a reference used to establish didactic practices and meanings to be created or, more easily, reproduced.

The strategies listed by the participants, imbued with symbols and meanings that give meaning to teaching, serve as support for thinking about teaching itself. Going further, co-occurrence with resources represents the link that Sewell Jr. (2017) highlights in their design of structure. We have, in this case, a structure of the didactic system around the teaching of oblique throwing, composed of cultural schemes and non-human resources (Physics and materials content) that, to a certain extent, represent an inseparability in the conception of the very structure of the didactic system. In specific teaching situations, for example, in a classroom with a teacher, we would highlight, still as part of the cultural phenomenon studied, the human resources that also integrate the structure of the didactic system.

Once some indications of elements of the *didactic culture* have been illustrated, we can highlight the concrete case of thinking about innovation in relation to this culture. The survey of indicative elements of the didactic culture provides references for a differentiation between innovation and reproduction of crystallized practices, so that the didactic innovation itself comes to be understood in terms of the *didactic culture* (whoever innovates, does so in relation to something).

In the research carried out, a first move in this direction occurred with the analysis of the teaching plan prepared by the intern with an innovative intention. It was possible to observe that, throughout the teaching plan, resources and strategies were indicated that both bring an innovative character and end up reproducing established practices, in some cases, even with the use of new resources. It is worth noting that, according to Sewell Jr. (2017) states, practices are renewed within themselves: it cannot be expected that a proposal for change in relation to culture does not bring elements of the culture itself in relation to which it tries to innovate. This cannot happen, since cultures change and reform themselves internally, even when they clash with others, due to their autonomous character. Thus, innovations in relation to *didactic culture* are expected to bring a sort of traditional elements combined with innovative elements.

The teaching plan contemplated the entire discussion on the topic of oblique launch that was planned to be dealt with over 8 classes of 50 minutes each, with two double classes per week. For the clipping we bring here, we can highlight some excerpts present in the specific section of the teaching plan that provided for the first two classes. Two excerpts that can be highlighted, which are part of the intern's teaching plan (Charts 1 and 2):

**Table 1 – Excerpt from the Teaching Plan Relating to the
Beginning of the First Class**

It is intended with these questions, direct a discussion among the members of the groups about the phenomenon observed during the launching of the object to the basket. [...]students are expected to realize that speed directly influences maximum range. Question what happened with each observed failure.

Source: Participant's teaching plan.

**Table 2 – Excerpt from the Teaching Plan for the Median Period of
the First Class**

Using the information you have obtained (preconceptions), build the knowledge necessary for the correct physical interpretation of the concepts. With the concept of motion and conditions explored, introduce the concept of ''Oblique throw'. Using the students' observations during the launch of the object to the basket, where each position the students were in, they could observe a different trajectory. Use these observations to conceptualize the bidirectional nature of launches and at what moment (when leaving the thrower's hand) the object would be in oblique motion and what forces were involved in the observed phenomenon.

Source: Participant's teaching plan.

In the highlighted excerpts, we can identify that there was an attempt by the intern to differentiate his action from an expository strategy, an element of *didactic culture*, at the same time that he seeks to value the externalization of students' understandings. The innovation component of the practice manifests itself, in this case, in the option of seeking to establish a dialogic interaction based on key issues and, later, rescuing the students' own speeches and conceptions. In addition, there was an attempt to reframe a resource present in the classroom: a wastebasket, which would have a didactic role and a practical meaning closely related to the teaching topic.

As simple as the didactic choice of the intern may seem, since it represents a certain obviousness in relation to the various contributions that research in science education has provided since at least the 1970s, it is a key situation conducive to instability: every innovation creates instability by not employing or employing little cultural references. From the perspective of research according to the concept of *didactic culture*, studying innovation would involve looking specifically at the action and the meanings that emerge from it, in these periods of possible instabilities. It is, therefore, a micro look at innovation situations that can effectively reveal the phenomenon of maintenance or transformation of aspects of the *didactic culture*, as well as the (non)survival of innovation[7] itself.

Conclusions

With this article, we hope to encourage a series of questions about the existence of a socially constructed environment that prevents – but also enables – the penetration and effectiveness of proposals for change in classrooms. We believe that, with the understanding of the teacher's reality using the notion of *didactic culture*, we can perceive it as im-

mersed in a system of symbols, meanings and practices that enable its performance in the world, but which also restrict its agency. In our studies, this not only allows us to better understand how to leverage innovative actions, but also to recognize that it is through the understanding of the teacher – that he/she is part of a system that guides him/her, *a priori*, in his/her practices –, that he/she can perceive the moments in which he/she makes a didactic decision contrary to his/her innovation proposal and that he/she can actively act to consolidate it.

It is worth mentioning that, despite being treated here as a parameter for innovation, the *didactic culture* has overflowed, in our studies, the limits of methodological use, assuming an epistemological character that concerns the construction of didactic knowledge about teaching. From the perspective of didactic culture, we have sought to understand fundamental questions about the functioning of classroom dynamics and to see the innovation processes of practices, paying attention to both the stage of creation of the innovation proposal and the stage of application in which it can be subverted.

As a still incipient theoretical concept, new deepenings and implementations of the notion are possible. We envisage conducting research that deals, for example, with the relationship between *didactic transposition* and the emergence of a *didactic culture* around topics recently inaugurated in basic education (for example, modern and contemporary Physics topics), an in-depth look at the relationship between non-human resources and the development of human resources in the midst of changes in the *didactic culture* (for example, what may be happening in the period in which this article is being prepared, with an Emergency Remote Teaching due to the covid-19 pandemic), or even a greater formalization of the concept of *structure of the didactic system*, based on the notion of *structure* by Sewell Jr.

Translated by Sabrina Mendonça Ferreira

Notes

1 The Parsonian idea of a cultural system would consist of a system of symbols and meanings that derive from an abstraction of social relations; abstraction, this one, which would not be a system of norms and institutions (social system). There are, in this sense, two distinct systems: the cultural and the social one.

2 It is worth noting that the opposition to the notion of culture as a system of symbols and meanings involves a more intense and complex debate than this text can imply. For example, in the debate in poststructuralist anthropology, there is even the proposal to abandon the term culture, based, among other aspects, on a self-critical posture of the field that recognized its morally and politically charged role in the studies of peoples, especially associated with European and American colonialism.

3 Own translation of the original "[...] values, beliefs, expectations, and conventional actions of a group" (Aikenhead, 1996, p. 8).

4 According to Chevallard (1991), the noosphere would be the sphere in which the didactic functioning would be thought, where the interested parties in the transposition of knowledge would be present, which could be both institutional and social. It would then encompass both the education system and the parts external to it, but which influence its functioning.

5 It is only possible to build indicatives, since, as we have already highlighted, the borders between cultures are not well defined, making it impossible and fruitless, then, to try to map a Culture in its entirety.

6 To count a co-occurrence between two categories, the program uses an algorithm that analyzes whether there is an intersection between two citations from different categories.

7 In the development of the research from which we took an example of application of the notion of Didactic Culture, in a subsequent step to those presented here, we turned our gaze to what actually happened in class situations and to the intern's interpretations of what happened. This allowed us to understand the trainee's frustrations and the possible abandonment of the innovative intention in new classes on the topic, in which there would be the possibility of a more direct reproduction of the didactic culture. This analysis is not presented in this article of a theoretical nature, as we understand that what we bring is sufficient to illustrate the proposed concept.

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